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BOTANICAL OBSERVATIONS

IN

WESTERN WYOMING,

WITH

NOTICES OF RARE PLANTS

AND

DESCRIPTIONS OF NEW SPECIES

COLLECTED ON THE ROUTE OF THE NORTH-WESTERN WYOMING EXPEDITION

UNDER

CAPTAIN W. A. JONES,

U. S. Engineer Corps, Department of the Platte.

BY

DR. C. C. PARRY.

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BOTANICAL OBSERVATIONS IN WESTERN WYOMING.

Number 1.

HAVING been connected with the exploring expedition of Captain W. A. Jones into Northwestern Wyoming during the past season (1873), the botanical results have proved of such unexpected interest that I have obtained the permission of Captain Jones to anticipate the more detailed official report by preparing for immediate publication a brief sketch of the general botanical features of the region passed over, with notices of rare plants and descriptions of new species collected on the route.

FORT BRIDGER TO CAMP BROWN. Leaving the point of rendezvous at Fort Bridger on the 12th of June, our route followed a northeasterly course over Green River basin, thence skirting along the southern spurs of the Wind River range. The main continental divide was crossed at South Pass. From this point following a more direct northerly course we reached Camp Brown in the Wind River valley on July 1st.

The chief botanical interest on this portion of our route was comprised in the many suggestive associations with the early discoveries of Nuttall nearly forty years previous. Though this route has been repeatedly traversed by exploring parties, lying in fact on the well-beaten track of western emigrant travel previous to the construction of the Pacific Railroad, not a few of the plants then collected and described have remained up to this time *desiderata* in herbaria.

Unusually copious spring rains previous to our journey had freshened the vegetation of these usually arid tracts, so that our necessarily slow and tedious marches, encumbered by a heavily laden wagon train, were enlivened (at least to the botanist) by unwonted verdure. Even the repulsive "sage plains" and "greasewood" flats, so monotonous and forbidding to the ordinary traveller, yielded up unexpected treasures of rare plants. Among these the evanescent annuals were in great profusion, including *Cleome aurea* Hook., *Calyptridium roseum* S. Watson, *Œnothera Andina* Nutt., *Œnothera scapoidea* Nutt., *Astragalus Geyeri* Gray, *Astragalus pictus* Gray, *Chænactis Douglasii* H. & A., *Plantago*

Patagonica Jacq., *Gilia inconspicua* Dougl., and *Oxytheca dendroidea* Nutt. In the moist grassy valley of Little Sandy were also found quite abundantly *Capsella divaricata* Walp. and *Gentiana humilis* Stev., heretofore overlooked by collectors in this region.

Of perennial plants, serving somewhat to relieve the prevalent and monotonous growth of *Artemisia*, *Tetradymia* and *Linosyris*, comprising what is popularly known as "wild sage," and the equally forbidding Chenopodiaceous shrubs confounded under the common term of "grease-wood," may be noted several species of *Astragalus* including *A. Purshii* Dougl., *A. lotiflorus* Hook, *A. glareosus* Dougl., *A. junceus* Nutt., and now collected for the first time since Nuttall's original discovery, *A. pubentissimus* Nutt. and *A. flavus* Nutt., the former a not uncommon roadside plant, and the latter quite abundant along the margins of dry water-courses, at the foot of steep clay buttes.

On gravelly knolls adjoining Green River still another interesting Nuttallian plant was rediscovered, *Tanacetum Nuttallii* Torr. & Gray, and growing in close proximity with this was found *Vesicaria Alpina* Nutt., both probably near the original station of Nuttall.

Nearly everywhere over this district in exposed situations we meet with *Eriogonum ovalifolium* Nutt., forming dense silvery cushions, its close globular heads of flowers exhibiting a great variety of tints from pure white to dark brown. Almost equally abundant on gravelly slopes also occur *Aplopappus acaulis* Gray, and *Astragalus simplicifolius* Gray, presenting a neat contrast of colors in their bright yellow and blue flowers, resting in mats of dark green and silvery foliage.

Quite constantly associated in growth with *Astragalus flavus* Nutt. is a showy asteroid plant with large white flowers, disposed in flattened summits surmounting the dull colored tomentose leaves. This plant, according to Dr. Gray, is closely allied to or perhaps identical with the *Xylorhiza villosa* Nutt. (*Aster Xylorhiza* Torr. & Gray). In view of the discrepancy in many respects between this plant and that described by Nuttall, Dr. Gray has thought proper to characterize it as a new species, *Aster Parryi*.

Among other plants worthy of note in this district may be enumerated *Delphinium Menziesii* DC., *Sisymbrium junceum* Bieb., *Viola Nuttallii* Pursh, *Cymopterus montanus* Nutt., *Cymopterus Fendleri* Gray, *Antennaria dimorpha* Nutt., *Artemisia*

pedatifida Nutt., *Phlox longifolia* Nutt., *Phlox canescens* Torr. & Gray, *Castilleia parviflora* Bong., *Pentstemon humilis* Nutt., and *Gilia pungens* Benth.

On reaching the higher ground forming the eastern rim of the Green River basin, which leads by an easy pass, at an average elevation of seven thousand feet above the sea level, from the Pacific to the Atlantic slope, the prevalent desert growth gives place to a vegetation partaking of a sub-alpine character. This district comprises the botanical localities designated by Nuttall as "dry and lofty hills in the central range of the Rocky Mountains."

Here accordingly we again come within the range of these early discoveries in re-collecting such choice plants as *Draba Alpina* L., var. *densifolia*, *Lepidium montanum* Nutt., *Trifolium Andinum* Nutt., *Trifolium gymnocarpon* Nutt., *Astragalus campestris* Gray, *Oxytropis lagopus* Nutt., and *Phlox bryoides* Nutt.

Here also we meet for the first time, probably near its southeastern limits, the interesting *Lewisia rediviva* Pursh. This becomes much more abundant farther north in the Wind River valley, and we were thus afforded an opportunity to observe this plant through its flowering and fruiting stages, extending from the latter part of June to the middle of July. After this latter period its matured capsules are detached and blown away, leaving no trace of the plant exposed to view, till the following spring develops the rosette of radical leaves, by which the Indians are guided in procuring their supplies of this palatable and nutritious root. Recent attempts have been made to introduce this showy plant into our gardens, where it would prove quite an acquisition.

Shrubbery is here represented mainly by *Rosaceæ*, including *Amelanchier Canadensis* Torr. & Gray, *Potentilla fruticosa* L., *Purshii tridentata* DC., *Ribes cereum* Dougl., but we look in vain, in apparently favorable localities, for the forms so well known in the mountain range farther south in Colorado of *Ribes deliciosus* Torr., *Cercocarpus parvifolius* Nutt., or *Jamesia Americana* Torr. & Gray.

The scanty pine growth includes chiefly *Pinus flexilis* James, with an occasional clump of *Abies Douglasii* Lindl., and *Juniperus Virginiana* L.

The southeastern spurs of the Wind River range present a succession of steep, grassy slopes agreeably interspersed with pine-clad ridges. Through numberless channels the mountain streams

collect their summer tribute of melted snow, and cleave their way to the lower valleys through deep gorges, disclosing in steep mural faces the structure and succession of the underlying, highly inclined, rocky strata. The lower undulating slopes, forming the natural divides between the numerous watercourses tributary to the main valley of Wind River, form irregular ridges often presenting smooth tabled summits, bedded with rich grasses interspersed with gaily colored flowers. Conspicuous among the latter are the bright golden-yellow heads of *Balsamorhiza Hookeri* Nutt., and *Balsamorhiza sagittata* Nutt., growing promiscuously, the close similarity of their flowers being curiously contrasted with their diverse foliage; even in the latter case, however, a tendency to assimilate (perhaps due to hybridization) is occasionally observed, in which the sharply hastate leaves of the latter species are irregularly gashed to resemble forms of the other. Besides these everywhere obtrusive forms, we may also note as characteristic of this district *Geranium Fremontii* Torr., *Arenaria congesta* Nutt., *Arenaria Hookeri* Nutt., *Astragalus campestris* Gray, *Oxytropis campestris* L., *Lupinus sericeus* Pursh, *Hedysarum Mackenzii* Rich., *Eriogonum flavum* Nutt., and *Calochortus Gunnisoni* Watson. On all the high rocky ridges of this section a charming variety of *Phlox Douglasii* Hook. is met with, forming close, flattened cushions, and a profusion of pure porcelain-white fragrant flowers.

Along the borders of streams, with the prevalent willow growth, we find *Betula occidentalis* Hook., *Alnus incana* Willd., and in the larger valleys *Elæagnus argenteus* Nutt.

On the steeper mountain slopes, before alluded to as presenting an agreeable alternation of meadow and woodland, the smooth grassy expanses of the higher elevations, reaching an altitude of nine thousand feet above the sea level, reveal a distinctly subalpine vegetation. We accordingly here encounter such well known forms as *Saxifraga nivalis* L., *Eritrichium aretioides* DC., *Polemonium confertum* Gray, *Lloydia serotina* Reich., while apparently more distinctly characteristic of this particular range we note *Townsendia spathulata* Nutt., *Townsendia scapigera* D. C. Eaton and *Bupleurum ranunculoides* L.

In the wooded districts *Pinus flexilis* is irregularly mingled with *Pinus ponderosa* and *Abies Douglasii*, while *Pinus contorta* forms the almost exclusive growth of the interior ridges and alpine

valleys. After passing the first series of steep ridges, which generally present an abrupt escarpment towards the main axis of the range, the interior valleys are spread out in the form of irregular basins, bordered by deep pine woods. Within these timbered recesses we occasionally encounter small grassy parks, or alpine bogs occupied by a close, clumpy growth of willows. Through these, course clear mountain streams generally hidden from view by overhanging vegetation. During the season of melting snow in the early summer months, these meadows frequently conceal treacherous bogs greatly impeding travel, while small ponds and occasional permanent lakes are not infrequent. In this variety of surface exposure, limited in every direction by irregular, rocky ridges, variously set off with extensive snow drifts, we have all the conditions of a most attractive mountain flora.

We accordingly find here in somewhat confused association the following plants:—*Draba Alpina* L., *Lupinus cæspitosus* Nutt., *Hedysarum boreale* Nutt., *Astragalus Alpinus* L., *Oxytropis campestris* L., *Oxytropis viscida* Nutt.? (or a species near it), *Sedum stenopetalum* Ph., *Sedum rhodanthum* Gray, *Actinella grandiflora* T. & G., *Antennaria dioica* L., *Senecio lugens* Rich., *Kalmia glauca* L., *Synthyris plantaginea* Benth., *Mertensia paniculata* Dougl., *Gilia nudicaulis* Gray, *Androsace septentrionalis* L., *Primula Parryi* Gray, *Gentiana humilis* Stev., *Phacelia sericea* Gray.

In succeeding articles the flora of the Owl Creek range and of the high mountain district between the Big-Horn and Yellowstone basins will be noticed.

Number 2.

WIND RIVER, which in pursuing a general southeast course drains the entire eastern slope of the Wind River range, also receives from the east and north the drainage of an extensive mountain district, to which, as a whole, no distinctive name has yet been applied. To the most southeastern extension of this mountain system the name of Owl Creek range has been locally applied. At the lowest point, where this merges into the open and elevated plains, the main stream, turning sharply to the north, loses the name of Wind River to assume that of the Big Horn, tributary to the Lower Yellowstone. Thus it happens that the same stream, under another name, in doubling on its upper course from southeast to north, receives lower down the eastern drainage of the Owl Creek range, and the broken mountain district to the northwest, through the little known Big Horn tributaries of Owl Creek, Gray Bull and Stinking Water.

Our route, instead of following down the main valley, crossed Wind River some distance above the sharp bend above referred to, thence crossing a low spur of the Owl Creek range, and skirting near the base of the high mountains to the west, passed Owl Creek, Gray Bull and several southern tributaries of Stinking Water, to ascend a main branch of the latter stream to its source

in the high divide separating its waters from those of the Yellowstone basin. On this route the chief point of botanical interest centred in the comparatively little explored district of Owl Creek range, the valleys of Owl Creek, Gray Bull and Stinking Water, and the high mountain region at the sources of the last named stream. We accordingly note briefly in their order of passing the features of botanical interest presented on our route.

The valley of Wind River, as its name suggestively implies, is especially subject to the sweep of fierce northwest winds, which necessarily leave their impress upon the native vegetation. Thus everywhere on the uplands and low open valleys there is a close uniform growth of stunted grasses, or the dull moorish aspect presented by the constantly recurring Artemisia. On saline flats the view is hardly improved by a ranker and more verdant growth of the spine-clad *Sarcobatus;* everywhere there is a monotonous recurrence of the same forms of vegetation, comprising such only as are capable of withstanding the combined unfavorable influences of a parched soil during the season of summer growth, followed by an early and rigorous winter. Only in moist, sheltered bottom-lands do we meet with anything like a rank vegetation, made up of dense willow thickets, occasional copses of *Shepherdia argentea* Nutt., with irregular scattering groves of *Populus balsamea.* Especially abundant in all damp, rich, alluvial tracts in this region we meet with the "wild licorice" (*Glycyrrhiza lepidota* Nutt.), here very commonly infested with a parasitic fungus, *Trichobasis leguminosarum* Link.

In the series of steep bluffs bounding the main river bottoms, the deep gullied ravines offer a greater variety of soil and exposure favorable to a diversified and peculiar vegetation. Here, accordingly, among other rarities we meet with a well marked new species of Astragalus, distinguished by its loose straggling habit, growing in light loamy soil, and sending up a loose spike of white flowers which rarely mature fruit. Prof. Gray has characterized this species (No. 65 of the distributed collection) as *A. ventorum,* n. sp. (see appendix). Here also along the slopes of high gypseous ridges we meet quite abundantly with a new composite, *Schkuhria* (*Platyschkuhria*) *integrifolia* Gray, n. sp. (see appendix, No. 150); of a habit and foliage quite unlike any other species of this genus.

On reaching the broken foot-hills of the Owl Creek range, both

the scenery and vegetation became much more diversified; and rounded slopes of disintegrated metamorphic rocks, sharp crests of upheaved strata, and extensive exposures of the brick-red Triassic formation, present in their varied exposures all the conditions for a varied flora. We accordingly here meet with such choice plants as *Stanleya viridiflora* Nutt., *Oxytropis campestris* L., var.? (No. 88), *Aplopappus multicaulis* Nutt., *Tanacetum capitatum* Nutt.

Farther up on the mountain slopes the increased elevation is evidenced by greater freshness of vegetation, the dull brown of the lowlands giving place to a rich soft verdure. Constant running streams, however, are still rare, as the altitude is not sufficient to afford heavy deposits of winter snow to keep up a supply of water through the dry summer months. As we again encounter pine woods composed mainly of *Abies Douglasii* and *Pinus flexilis*, the associated undergrowth is again brought to view in thick, matted growths of *Arctostaphylos uva-ursi*, and occasional patches of *Berberis Aquifolium*. Still there is a characteristic absence of many forms such as one would naturally look for in such localities, neither scrub oak, Rubus nor Symphoricarpus being here represented. Very common and attractive over all this district are the bright, showy flowers of a species of Lupinus (No. 54) allied to *L. sericeus* Ph.? but difficult to refer to any described species; here also *Hedysarum boreale* Nutt. is conspicuous, with its slender spikes of nodding pink flowers, occasionally inclining to a dull pinkish-white. On the crests of the dividing ridge attaining an elevation of nine thousand feet there are extensive exposures of an arenaceous limestone, presenting tabled summits and perpendicular mural faces, with irregular broken talus at their bases. These localities offer not only very attractive points of view of the adjoining country, but afford a rare field for the botanist. Here in rock crevices was found the charming dwarf columbine, which, in compliment to the enterprising commander of the expedition, and its first actual discoverer, I have named *Aquilegia Jonesii*, n. sp. (see appendix, No. 3). This species, which is most nearly allied to *A. vulgaris* L., is sufficiently distinguished by its dwarf size and close caespitose habit, as well as other well marked characters indicated in the description referred to. It would no doubt prove highly ornamental in cultivation, but unfortunately at the period of our collection (in July) the fruit was just maturing,

and it was only by diligent search that sufficient late flowering specimens were met with to complete the description.

Besides this choice addition to our native flora, other plants worthy of note may be enumerated, viz: *Anemone multifida* DC., *Arenaria arctica* Stev., *Arenaria Rossii* R. Br., *Lupinus minimus* Dougl., *Oxytropis campestris* L., *Spiræa cæspitosa* Nutt., *Saxifraga Jamesii* Torr., *Saxifraga debilis* Engel., *Phlox Douglasii* Hook., *Polemonium confertum* Gray, *Androsace chamæjasme* L., *Castilleia pallida* Kth., *Lloydia serotina* Reich.

The peculiarities of the timber growth in this section will be more fully dwelt on in a subsequent article; it is sufficient here to note the regular order of succession everywhere noticeable as distinct zones of arborescent growth. Thus the lower mountain slopes are occupied by scattered groves of *Pinus ponderosa* and *Abies Douglasii*, succeeded higher up by *Pinus flexilis* and *Pinus contorta*, while the highest ridges support a dense forest of *Abies Engelmanni*.

In descending the northeastern slope of the Owl Creek range, forming the western edge of the Big Horn basin, we come upon principal tributary streams draining the high mountain region to the west. In all these valleys, including Owl Creek, Gray Bull and Stinking Water, a uniform character of vegetation is observable, constituting a very distinct botanical district. On the steep gravelly ridges bounding the valley of Owl Creek was first noticed a very remarkable species of *Stanleya*, distinguished from all other known species of this interesting genus by the dense tomentose covering of its stem and foliage, and the sharply hastate form of its leaves. I have accordingly named it *Stanleya tomentosa*, n. sp. (see appendix, No. 13). This plant, then (July 20), in the full glory of its dense spike of cream-colored flowers, formed a conspicuous feature in the floral landscape. In this same locality was also found a new species of *Phelipæa*, which on account of its bright yellow color I have named *Phelipæa lutea*, n. sp. (see appendix, No. 202). This plant, which is met with growing in close proximity to the allied species, *Phelipæa fasciculata* Nutt., furnished an opportunity for a direct comparison of fresh living specimens, thus affording a more satisfactory means of distinguishing specific difference than could be derived from the dry faded plants. Along the borders of a dry ravine was collected a yellow flowered *Astragalus* with nearly mature fruit. This, on a cursory view, I

noted as a form of *A. flavus* Nutt., previously collected on Green River. Prof. Gray, to whom specimens were sent under the above name, recognized its distinct character. I have therefore ventured to compliment the *actual* discoverer, as well as the chief elucidator of this difficult genus of western North American plants, by naming it *Astragalus Grayi*, n. sp. (see appendix). A side trip by a detached topographical party to the rugged peak named by Capt. Jones "Washakee's Needles" revealed, in a few fragments brought back by the party, a more distinct alpine flora than any yet seen, including *Douglasia montana* Gray, and a most singular depressed *Townsendia*, with its large single heads immersed in a globular mass of lanulose coated leaves. This, as far as the imperfect material affords the means of judging, is probably an undescribed species, to which the name of *Townsendia condensata*, n. sp., may be provisionally applied. In the lower mountain ranges there is a succession of charming subalpine meadows, set off with limpid lakes and traversed by clear ice-cold brooks, which, among other well known plants, furnished the following additions to our list, viz: *Astragalus oroboides* Hornem., *Œnothera breciflora* Torr. and Gray, *Aplopappus inuloides* Torr. and Gray, *Artemisia incompta* Nutt., and the singularly neat European species *Myosotis alpestris* L. In the valley of Stinking Water (a most inappropriate name for a clear mountain stream abounding in the finest trout), at a single locality, was collected the rare Chenopodiaceous plant characterized by Dr. Torrey as *Endolepis Suckleyi* Torr. This, in the unpublished revision of this family by Mr. S. Watson, is to be included in the genus *Atriplex* (*A. Endolepis* Watson, mscl.). The excellent figure of this plant in Vol. xii. pl. 3, of "Pacific Railroad Reports," only fails to represent the straggling habit, densely divaricate branches and the blistered, mealy-dusted leaves of this species. It seems to affect a peculiar soil, so strongly impregnated with saline ingredients as to be entirely bare of all other vegetation.

In our course up the valley of Stinking Water there was little of botanical interest to attract the attention. The prevalent rocks were composed of a coarse igneous conglomerate, which weathered into the most fantastic shapes, presenting on either hand sharp pinnacles, toppling columns and chimney peaks; but the uniformity of soil derived from its disintegration was unfavorable to a rich development of floral forms. We accordingly note briefly the

following as most abundant and characteristic: *Arenaria pungens* Nutt., var. *Astragalus microcystis* Gray. *Heuchera cylindrica* Dougl., *Balsia leucophylla* DC., *Stephanomeria paniculata* Nutt.

On reaching the upper portion of this valley, becoming more densely wooded, and frequently spreading out into open, grassy parks, a much more attractive and varied flora is brought to view. The pine woods, composed almost exclusively of *Pinus contorta*, with scattering trees of *Abies grandis*, and in the drier mountain slopes of *Abies Douglasii*, overshadow thick moss-bedded festoons of *Linnæa borealis*, associated with *Pyrola minor* L., and occasionally the more peculiar western form of *Pyrola dentata* Hook. Here too occurs abundantly *Antennaria racemosa* Hook., with sterile and fertile plants growing in distinct plots; scanty specimens were also collected of what is probably the little known *Antennaria luzuloides* Torr. and Gray. Everywhere on the moist, wooded slopes is a thick undergrowth of *Vaccinium myrtilloides* Mx. Rhamnus is represented by the well known northern form of *Rhamnus alnifolius* L. Her., and on the margins of ice-cold springs we meet with *Mimulus moschatus* Dougl. In ascending the higher mountain peaks, the rocky crags are brilliantly adorned with clumps of *Pentstemon deustus* Dougl., or the more showy *Pentstemon Menziesii* Hook. Along the borders of alpine brooks, together with the wide-spread *Mertensia Sibirica* Dougl., we meet with the showy *Mimulus Lewisii* Ph., so interesting in its association with the early explorer Lewis. *Mitella trifida* Gray is here found associated with the more common *Mitella pentandra* Hook. In similar localities, strangely remote from their original habitat, we meet with *Zauschneria Californica* Presl and *Kellogia galioides* Torr.! Near the bald alpine summits, where the ground is saturated from the recent melting of snow-drifts, grows the "California heath," *Bryanthus empetriformis* Gray, and here also at the most eastern locality yet noted was found a dwarf form of *Spraguea umbellata* Torr. The occurrence of so many peculiar Californian forms in such an isolated locality on the Atlantic slope is very suggestive.

On the high alpine crest at the head of Stinking Water, overlooking to the west the Yellowstone basin and its magnificent lake, a more alpine flora is exhibited, though composed mainly of dwarfed forms of plants met with lower down, as may be seen from the following list, noted down August 2, viz: *Arabis Drum-*

mondii Gray, *Arabis canescens* Nutt., *Draba alpina* L., *Smelowskia calycina* C. A. Mey., *Arenaria arctica* Stev., *Ivesia Gordoni* Torr. and Gray, *Potentilla dissecta* Pursh, *Astragalus alpinus* L., *Astragalus Kentrophyta* Gray, *Lupinus minimus* Dougl., *Sedum stenopetalum* Ph., *Townsendia* (not determined as to species. No. 145), *Erigeron compositum* Ph., *Senecio canus* Hook., *Achillea millefolium* L., *Phlox Douglasii* Hook., *Polemonium humile* var. (*P. parvifolium* Nutt.). *Mertensia alpina* Dougl., *Myosotis alpestris* L., *Eriogonum ovalifolium* Nutt.

In a concluding article, the general botanical features of Yellowstone Park and the head waters of Snake and Wind Rivers will be considered.

Number 3.

The very full botanical list contained in Hayden's Reports for 1871–72 includes most of the plants met with in the Upper Yellowstone basin, being comprised within the limits of the Yellowstone National Park. But as no attempt is made in the above reports to present the subject in its physiographical aspects, and the list as a whole embraces plants derived from other distinct botanical districts, I propose to continue the itinerary sketch of the botanical features presented on our route, noting the characteristic, peculiar, or undescribed plants as they are cursorily brought to view.

The elevated, irregular and bare mountain ridges that bound the Upper Yellowstone basin on the east command by far the finest prospect of this remarkable district. In approaching from any other direction, the distant view is mainly shut off by the dense pine forests that almost continuously cover the adjoining country; but from the Stinking Water divide, reaching above the timber line, the unobstructed view takes in the whole scope of adjoining woodland, the broad expanse of the lake with its deeply indented shores and rocky islets, and on a clear morning wreaths of misty fog, which, rising here and there out of the forest depths, reveal the locality of steam jets or boiling springs.

On leaving these attractive heights to plunge into the sombre forests, we soon lose the peculiar subalpine flora, which gives place to more common woodland forms.

Aquilegia flavescens of Watson is especially abundant with its loose straggling habit and light yellow blossoms, less showy than most species of this attractive genus.

Ledum glandulosum Nutt. is here noticed for the first time on our route, forming bushy clumps with laurel-shaped leaves, and scant clustered heads of white flowers.

Erythronium grandiflorum Pursh here presents in form and habit an exact western counterpart, on a larger scale, of our well known eastern species. Mosses and wood lichens in greater pre-

fusion and variety indicate a moister climate; and along the borders of innumerable springs and ice-cold brooks grow the ordinary forms before noticed, including species of *Cardamine*, *Saxifraga*, *Mitella*, *Mimulus*, *Mertensia*, *Habenaria*, etc., etc.

The absence of any well-marked trails, and the annoying obstruction of fallen timber, obliging frequent détours, are apt to confuse the sense of direction even in those most experienced in wood-craft, and frequent reference to the compass is necessary to maintain a direct course. It is therefore a great relief, both to man and animals, to emerge occasionally into open grassy valleys, which offer something else to engage the eye and thought more pleasantly than dodging the scraggy branches of overhanging pine trees, or devising the best way of escape from a perfect maze of fallen trees. To the botanist especially these little open parks afford the most satisfactory field for observation and collection, however seriously interfered with by the persistent annoyances of insect pests. The Gramineæ here brought to view comprise the ordinary northern forms, including *Phleum alpinum* L., *Vilfa asperifolia* Nees and Meyen, *Agrostis scabra* Willd., *Muhlenbergia Mexicana* Trin., *Calamagrostis Canadensis* Beauv., *Calamagrostis Lapponica* Trin., *Koeleria cristata* Pers., *Melica bulbosa* Geyer., *Poa Andina* Nutt., *Festuca ovina* L., *Bromus breviaristatus* Thurber, *Triticum ægilopoides* Turcz, etc., etc. The Cyperaceæ are represented by *Eriophorum polystachyon* L., *Carex rigida* Good., *C. Jamesii* Torr., *C. Douglasii* Boott, *C. aquatilis* Wahl., *C. Raynoldsii* Dewey, *C. leporina* L. and *C. tenuirostris* Olney, ined.

On reaching the shore of Yellowstone Lake the great variety of exposure bordering this magnificent body of water, at an elevation of seven thousand four hundred feet above the sea level, added material attractions to the native flora. High bluff banks here alternate with stretches of sandy or gravelly beach, while numerous inland lagoons, frequently heated by boiling springs, maintain a local temperature often too high for the ordinary phænogamous plants. When, however, this source of internal heat is properly tempered, there is induced a profuse hot-bed growth. But the specific forms are not materially different from those elsewhere exhibited. Strikingly conspicuous among less showy plants were the profuse blossoms of *Gentiana detonsa* Fries, presenting flowers of unusual size, and streaked with the most delicate shades of azure blue. A peculiar form of *Pentstemon secundiflorus* Benth.

was equally distinguished by its brilliant colors and cultivated style of growth. Of other plants affecting such locations we may mention *Spraguea umbellata* Torr., *Chænactis Douglasii* Hook., *Eunanus Fremontii* DC., and, more singular in its associations with neglected fields and gardens, *Brunella vulgaris* L. and *Scrophularia nodosa* L.

Another peculiar plant of this district is that characterized by Dr. Torrey in Hayden's Report as a new genus of Lobeliaceæ, viz: *Porterella carnulosa* Torr. By some inadvertence the synonym of the original plant, described in Botany of Beechey's Voyage, page 362, under the name *Lobelia carnosula* H. and A, was quoted as *Lobelia carnulosa* H. and A., and the changed name adopted for the typical species of this proposed genus. It is still doubtful whether the distinguishing characters are sufficient to entitle this plant to generic rank as distinct from Lobelia. The localities in which it was invariably found were recently exsiccated pond-holes in open grassy valleys, which it adorned profusely with its delicate blue flowers; it was here quite constantly associated with *Nasturtium curvisiliqua* Nutt.

While searching in similar localities near the falls of the Yellowstone for fruiting specimens of the latter plant, my attention was directed to a dense subaquatic growth, occupying the basin of a shallow muddy pond. This proved to be *Isoetes*, which Dr. Engelmann, who has assiduously studied this difficult genus, has characterized under the name of *Isoetes Bolanderi* var. *Parryi*. (See Appendix, No. 307.) The numerous additions to this genus, lately made under the inspiring influence of Dr. Engelmann's researches, show how largely dependent is the introductory work of the botanical collector on the supplementary labors of the herbarium botanist.

On the elevated grassy slopes, which at different points afford an agreeable relief to the uniform forest growth, we invariably encounter a well marked subalpine flora in the prevalence of such attractive forms as the following, namely: *Caltha leptosepala* DC., *Oxytropis nana* Nutt.? *Astragalus Kentrophyta* Gray, *Bupleurium ranunculoides* L., *Aster pulchellus* DC. Eaton, *Erigeron ursinum* DC. Eaton, *Aplopappus suffruticosus* Gray, and *Senecio amplectens* Gray. At lower elevations the same open character of country, agreeably set off with copses of *Abies grandis* Lindl., afford a still larger number of interesting forms, including *Ribes*

viscosissimum Pursh, *Peucedanum leiocarpum* Hook., *Ligusticum scopulorum* Gray, *Lonicera cærulea* L., *Aster conspicuus* Lindl., *A. integrifolius* Nutt., *A. elegans* Torr. Gray, *A. Engelmanni* Gray, *Senecio triangularis* Hook., *S. Andinus* Nutt., *Hieracium Scouleri* Hook., *Gaultheria myrsinites* Hook., *Orthocarpus Parryi* n. sp. Gray (see Appendix, No. 218), *Echinospermum deflexum* Lehm., *Spiranthes Romanzoffiana* Cham., *Fritillaria pudica* Spreng., *Calochortus eurycarpus* S. Watson, *Botrychium simplex* Hitchcock.

At the head of Yellowstone Lake, fringing the muddy shores of one of its numerous inlets, was found in great abundance the well known European plant, *Subularia aquatica* L. This has been regarded as one of the rarities on the American continent, and has been termed by Dr. Gray one of "the late lingerers" which has just managed to maintain its foothold in a few isolated New England lakes: but it seemed to be quite at home on the banks of the Yellowstone. While it is by no means unlikely, as suggested by Dr. Gray, that from its diminutive size and mode of growth, it may have been overlooked in intermediate localities, its occurrence here, in such profusion, so remote from any recognized connection with an ancestral source, is very suggestive in its bearing on the question of geographical distribution, and derivative origin of species. Certainly the localities on this continent where it might have persisted, if originally spread round the northern hemisphere, are sufficiently numerous not to leave such wide gaps as that between Maine and Wyoming! Doubtless, as in other apparently unaccountable cases, future discovery either east or west will help to fill up this chasm.

In the numberless ponds and lagoons which occur near the head of Yellowstone Lake only the usual forms of northern aquatic plants were noticed, including *Ranunculus aquatilis* L., *Nuphar advena* Ait., *Utricularia vulgaris* L., *Lemna trisulca* L., *Typha latifolia* L., *Sparganium simplex* Huds., *Zannichella palustris* L., *Potamogeton perfoliatus* L.

In none of these promising localities was I able to detect the *Nuphar polysepalum* Engel., which seems singularly to affect isolated localities.

The various confervoid growths and obscure vegetable organisms in connection with the numberless hot springs of this region will no doubt reward the special researches of the microscopical

botanist with new and peculiar forms. Before taking final leave of the Yellowstone Park district, it may be proper to allude briefly to the character of the forest growth, so obtrusively forced on the attention of the traveller. Not less than ninety-nine per cent. of the pine growth of this district is made up of the single species, *Pinus contorta* Dougl. Mile after mile of continuous forest may be traversed without seeing any other arborescent species, and their tall, straight, uniform trunks and scattering foliage will be always associated with the monotonous and disagreeable features of the park scenery. Only where the blazing camp-fire sends forth its grateful warmth to relieve the ordinary chill of a night temperature, where the thermometer in August ranges between 36°F. and 14°F., do we realize a manifest utility in this wide-spread forest production. Occasionally, in low moist ground, the balsam (*Abies grandis*) comes in to vary the sombre scenery, and add a deeper gloom to these shaded recesses. On higher mountain ridges, *Abies Engelmanni* Parry makes its appearance, always indicating an elevation of between eight thousand and nine thousand feet above the sea. With this latter is associated, as in the higher mountains farther south, *Pinus flexilis* Torr., but at no point was seen in this district the more exclusively alpine form, *Pinus Balfouriana* Murray.

Abies Menziesii Lindl., which is credited to the park district in Prof. Porter's list, was not seen by me, and as my attention was particularly directed to this subject of forest distribution, it could hardly have been overlooked. It is possible that some of the peculiar forms of *Abies Engelmanii*, in which the cones with their lengthened scales approach *Abies Menziesii* (though still plainly distinct), may have been mistaken in herbarium specimens for this latter species, which was not met with on our route after leaving Wind River valley.

Our route from the southern head of Yellowstone Lake passed by an almost insensible grade to one of the numerous eastern branches of Snake River; thence, skirting along the irregular mountain range to our left, we passed in full view of the Grand Tétons on our right, from which, making a sharp détour to the east, we reached a low divide at the head of Wind River. On this part of our route, being late in the season and on a hurried march, but little opportunity was afforded for botanizing. The general aspect of the flora, as judged from the autumnal forms, was

not materially different from other districts passed over in our previous route. Of plants not elsewhere noticed may be mentioned *Sphæralcea acerifolia* Nutt. and *Rudbeckia occidentalis* Nutt. Near the summit of the high rocky peak overlooking Snake and Wind River valleys was found a new species of Draba characterized by Dr. Gray, under the name of *Draba ventosa* n. sp. (see Appendix, No. 15) : also *Aster montanus* Rich, the latter only known from high northern collections in British America.

From this accessible pass, by which the Yellowstone Park can be reached on a very direct route, we passed rapidly down the open valley of Wind River and reached our previous rendezvous at Camp Brown, on September 12th, after just two months' absence.

Number 4.

THE numbers are those affixed to the tickets in the distributed collection, and referred to in the preceding articles. The characters or descriptions which follow are by the botanists respectively whose names are appended to their several contributions, — in which the collector, having been summoned to a remote frontier, is able to take only a small part.

3. AQUILEGIA JONESII.—Acaulescent, minutely soft-pubescent; leaves all crowded, and the persistent scale-like dilated bases of their petioles imbricated on the stout ascending branches of the rootstock, biternately divided: the primary divisions with very short if any partial petioles, and the secondary ones sessile or confluent at base, so that the nine small and obovate entire leaflets or divisions are in a dense cluster; scape from one to at length three inches high, naked, exceeding the leaves, one-flowered, sepals and petals blue; the former oblong, exceeding the gradually tapering straightish spurs; styles long, exserted; pods turgid, reticulated, smooth.—In crevices of loose arenaceous limestone, on the summit of Phlox Mountain, forming close clusters. A remarkable and most distinct, very dwarf species, collected July 18, mostly out of flower, and with full-grown fruit; but a few blossoms were secured. The species is dedicated to Capt. W. A. Jones, U. S. Engineer, who first detected this interesting species, and to whose efficient aid as Commander of the expedition the botanical collection is largely indebted for its most valuable results.—C. C. PARRY.

13. STANLEYA TOMENTOSA.—Very stout, white-villous or hirsute throughout (especially the foliage and lower part of the stem); radical and lower leaves lyrate-pinnatifid in the manner of *S. pinnatifida*, the upper ones entire and hastate, passing into lan-

ceolate and finally into subulate bracts for the lower flowers; raceme very dense and thick, cylindrical (becoming a foot or a foot and a half long), of almost innumerable pale cream-colored flowers; pedicels in fruit about the length of the filiform stipe.—Owl Creek on dry slopes in gypseous soil. Biennial, perhaps sometimes perennial by offshoots, one to three feet high. Petals lanceolate, oblong, narrowest in the centre. Stigma green.—C. C. PARRY.

DRABA VENTOSA.—Depressed and cæspitose, branching from slender rootstocks, canescently tomentose throughout, the pubescence stellate; leaves crowded on the mostly tufted branches, spatulate oblong or obovate, entire, not rigid; peduncle in fruit exserted beyond the leaves, corymbosely 3-5-flowered; petals golden yellow; silicle oval or orbicular, tomentulose-hirsute, tipped with a short distinct style.—On a high rocky peak overlooking Snake and Wind River valleys. The larger and laxer leafy shoots are an inch and a half or more in height; the denser shorter and in a close tuft. Leaves 3 to 5 or even 6 lines long, of soft and herbaceous texture, obtuse and pointless, tapering to the base; the pubescence wholly soft and stellate, the stellular tuft generally slender-stipitate. Scape or peduncle half an inch to nearly an inch in length when fully developed. Petals obovate or spatulate, 2 lines long. Silicle fully 2 lines wide, $2\frac{1}{2}$ to $3\frac{1}{2}$ lines long; the abrupt style half a line to nearly a line long. The foliage is not unlike that of the imperfectly known *D. eurycarpa* Gray, of the Sierra Nevada.—A. GRAY.

65. ASTRAGALUS (ONOBRYCHOIDES) VENTORUM Gray MS.—Somewhat canescent with short appressed hairs; the stems from a subterraneous perennial rootstock, erect, 4-6 inches high, flexuous, simple; stipules large and scarious, free from the petiole, united and amplexicaul; leaflets 4–8 pairs, broadly obovate, 4–6 lines long, rounded or retuse at the apex; racemes loose, short peduncled, equalling the leaves; flowers 5–6 lines long, light yellow, the tubular-campanulate calyx 3 lines long, with short setaceously tipped teeth; legume sessile, slightly pubescent, turgid, oblong, 6–9 lines long, slightly curved, completely 2-celled, the ventral suture somewhat prominent and the dorsal slightly impressed.—Collected on Wind River; differing from the other species of the section in its habit, which is that of *A. succumbens*, in its yellowish flowers and larger legumes.—S. WATSON.

75*a*. ASTRAGALUS (PECTINATI) GRAYI Parry MS.—Distinguished from *A. pectinatus* by the broader leaflets, which are 1-$1\frac{1}{2}$ inches long by $1\frac{1}{2}$–$2\frac{1}{2}$ lines broad, quite strongly veined, and by the somewhat thinner pod, ascending instead of deflexed. The flowers are "light yellow."—On the gravelly ridges bordering Owl Creek valley.—S. WATSON.

126. ASTER (ORTHOMERIS) PARRYI.—A span high, hoary, with a thin loose tomentum; stems several from a rather woody rootstock, simple, the naked peduncle-like summit bearing a single large head; leaves spatulate, cuspidate; scales of the involucre in two series, oblong-lanceolate, very much acuminate, cinereous-pubescent; rays numerous, white, over half an inch in length; akenes very white-villous.—A. GRAY.

144. TOWNSENDIA PARRYI.—Perennial, canescently pubescent; the caudex very short; leaves rosulate, obovate-spatulate, often apiculate, tapering into a petiole of about an inch in length; peduncles stout (2–4 inches long), solitary or several, somewhat leaf-bearing below, naked above and bearing single large heads; scales of the involucre in 3 or 4 series, lanceolate, acute, herbaceous, with scarious lacerate-ciliate margins, the inner ones acuminate; rays bright blue, double the length of the involucre; pappus the same in rays and disk, persistent, of stout and unequal barbellate bristles, a little longer than the akenes.—In the Wind River Range at 9,000 feet alt. (referred to as *T. scapigera* on p. 13). This very beautiful daisy is closely related to *T. scapigera*, and has much the same foliage and a similar pappus and achenium, but the heads are fully as large as those of *T. grandiflora* ($1\frac{3}{4}$ to 2 inches broad), are supported on very stout stalks, and have the rays bright blue. The involucral scales are more pointed than in *T. scapigera*, and the leaves are usually apiculated, as they are not in the latter.

With very fine specimens of the above, Dr. Parry has also collected *T. spathulata* Nutt. (Nos. 142 and 145), and a single plant of a very different species which he proposes to call

T. CONDENSATA (no number. See p. 106). — It has a proper caudex two inches long, marked with the scars of former leaves, and at the top bears a dense mass of small, oblong-spatulate, white-hairy leaves, and, buried among them, a single sessile head rather larger than that of *T. sericea*. The involucre is composed of numerous very narrow acuminate scales, which are lacerate-ciliate along the scarious margin. The pappus consists of rather long barbellate bristles, that of the (infertile?) rays similar but scantier. The rays are pale pink, and about eight lines long, and the disk-florets exceedingly numerous. Not having seen a specimen of Nuttall's *T. incana*, I have some doubt as to whether this may not be his plant of that name. If not, it may properly bear the name which Dr. Parry has proposed. It grew on a high peak in northwestern Wyoming. — D. C. EATON.

164. APLOPAPPUS (STENOTUS) MULTICAULIS.—*Stenotus multicaulis* Nutt., Torr. and Gray, Flora. Wind River.—An interesting rediscovery of this species, which seems to hold truly distinct from *A. acaulis*, which is also in the collection (157).—A. GRAY.

150. SCHKUHRIA INTEGRIFOLIA.—Hoary-puberulent, becoming glabrate; scapiform flowering stems a span high from a branching caudex, leafy only at base, bearing one to four or five loosely corymbose heads; leaves alternate, thickish and coriaceous, oval or sometimes oblong, entire, lightly 3-nerved, abruptly narrowed into a slender petiole; scales of the hemispherical involucre 10–14, oblong-lanceolate, acute, shorter than the disk; flowers yellow; rays 6–9, exserted, oblong, often 3-toothed; akenes linear-cuneate and 4-angled; paleæ of the pappus linear-lanceolate, hyaline, mucronate or short-awned by the excurrence of the stout midrib or else in the outermost flowers oblong and pointless. — Wind River valley, on high gypseous ridges.

A narrow-leaved form of this ambiguous composita (var. *oblongifolia*) was collected by Prof. Newberry in McComb's expedition several years ago, at "San Juan" (either in Utah or New Mexico); and Dr. Parry has now found it much farther north. The character here given is copied from a still unpublished revision which I have recently made of the genus, as now extended according to the views of Bentham in the Genera Plantarum, where it is made to include *Achyropappus* (of which section we have *S. Neo-Mexicana*, *S. Bigelowii*, *S. Woodhousei*, *S. pedata*, and *S. biternata*, all but the first published by me under *Bahia* or *Achyropappus*; and now the present species adds a peculiar section, *Platyschkuhria*, with perennial root, peculiar foliage and habit, but the head and flowers of *Achyropappus*. — A. GRAY.

153. ARNICA PARRYI. — About a foot high, hirsute and glandular; stem simple, naked above, bearing (excepting bracts) only one or two pairs of cauline leaves and 1–5 rather small heads; radical and lowest cauline leaves ovate or ovate-lanceolate with obtuse or acute base tapering into a short margined petiole, lightly 3–5-pliveined, acutely denticulate; the others small and sessile or bract-like; lateral peduncles short; involucre somewhat turbinate; rays none; akenes almost glabrous: pappus densely barbellate in the manner of *A. mollis*.—*A. angustifolia*, var. *discoidea latifolia* Gray in Sill. Jour. 33, p. 238. *A. angustifolia*, var. *eradiata* Gray in Proc. Acad. Philad., 1863, p. 68. Mountains of Colorado (Parry, Hall and Harbour, Greene), and now found by Dr. Parry in Wyoming. Rev. Mr. Nevius sends a specimen from the mountains in Oregon. Allied on one hand to *A. mollis*, on the other to broad leaved forms of *A. alpina*. Seemingly a well marked species in a genus the species of which are hard to limit.*—A. GRAY.

156. ARNICA FOLIOSA Nutt.—*A. Chamissonis* Torr. and Gray, in part. This is a dwarf and less downy form of a species which abounds from the Rocky Mountains to the Sierra Nevada, in the latter region passing into var. *incana*, a densely white-tomen-

* Our North American species throughout appear to have yellow anthers and more or less hairy corolla-tube,—except the two peculiar to Unalaska and the other Aleutian Islands, which have blackish anthers. Both were collected by Harrington and Dall in the exploration under the command of the latter; and they seem to be distinct, although Herder has lately combined them. *A. Unalaschkensis* has the tube of the corolla wholly glabrous. This is said to be the case in the original description of *A. obtusifolia* Less., but in our specimens the many jointed hairs common in the genus certainly occur. The *A. Chamissonis* of Schmidt's Flora Sachaliensis has the same dark anthers, and in foliage also differs considerably from the original *A. Chamissonis*.—A. GRAY.

tose variety. It is Nuttall's *A. foliosa*, which I had referred to *A. Chamissonis*, incorrectly, as I am now convinced, but all these species seem to run together inextricably. Nuttall's name is a good one, and so, on the whole, is the species which on a survey of the genus it seems necessary to revive.—A. GRAY.

202. PHELIPÆA (APHYLLON) LUTEA.—Resembles *P. fasciculata;* but the whole plant is of a light yellow color and more glandular-hairy; peduncles only about twice the length of the flower; corolla sulphur-yellow.—Dry and sandy hillsides, Owl Creek; parasitic on roots of grasses.—C. C. PARRY.

215. PEDICULARIS PARRYI Gray, *var.* PURPUREA.—Abundant in pine woods at the foot of Yellowstone Lake. I do not find any marked characters to distinguish this from *Pedicularis Parryi* of the Colorado Rocky Mountains, except the larger dull *purple* flowers, the lanulose-ciliate bracts, filaments slightly hairy, and leaves more sharply serrate, with the divisions *broader* and *less* divaricate.—C. C. PARRY.

218. ORTHOCARPUS PARRYI.—Differs from *O. pallescens* Gray in somewhat greater height (almost a foot high) and in the close and short cinereous pubescence; corolla broader and yellowish, its more decidedly trisaccate lower lip equalling in length the broad galea, its 3 lobes equal, oval, obtuse, about the length of the saccate portion.—Pacific Springs, etc. Flowers 7 lines long; the lower rather distant, in the axils of green and foliaceous laciniate-pinnatifid bracts; calyx 2-cleft to the middle, nearly equalling the yellowish corolla and apparently slightly yellowish.—A. GRAY.

CAREX TENUIROSTRIS Olney.—Spike ovate or nearly round (8-11 mm. long, 7-10 wide), composed of 5-10 or more spikelets in a dense head staminate at the base; bracts short, leafy, lower margins hyaline; stigmas 2; perigynium narrow, ovate, lanceolate (3·2 mm. long, ·8 mm. wide), tapering to a very slender beak with an obliquely cut membranous orifice fringed at top, faintly nerved, doubly serrate and winged on the margins from the base of the oblique cut to half way down, longer than the entire ovate acute hyaline green nerved scale (2-2·1 mm. long, 1-1·5 broad), never hispid; achenium straw colored, oblong, stiped (1·4 mm. long, ·6 mm. wide).—Stipe 4 mm. long; achenium 1·4 mm.; style 2·2 mm.; stigmas ·8-4·8 mm.; root fibrous, culm 6-8 cm. high, leaves flat; margin finely serrated, rough and pointed at top, narrow, and shorter than culm.

It resembles *Carex Haydeniana* in size, leaves and general aspect. It differs in the color of its spikes, its bracts, but principally in its perigynium which is narrower, and in its orifice fringed at top, and in this differing from its other close ally *C. leporina* and from *C. festiva* more remote. From *C. festiva* it differs as indicated, and in the wings and serratures of the perigynium not extending to the base.—S. T. OLNEY.

307. ISOETES BOLANDERI Engelm.—Trunk deeply 2-lobed; leaves (5–20, 2–4½ in. long) 4-angled, slender, tapering to a very fine point, bright green, soft; epidermis cells elongated; with stomata, but without peripherical bast bundles; sporocarp mostly oblong, covered about ⅓ or ¼ by the velum, unspotted; macrospores (0·30–0·45 mm. wide) beset with minute points and wrinkles; microspores (0·026–0·31 mm. long) more or less papillose or spinulose, deep brown.—In ponds and shallow lakes on the Sierra Nevada of California, at an altitude of 5,000–10,000 feet, "scattered or rarely in small patches" (Tuolumne, Mount Dana, Mono-trail, Cisco, Mary's Lake, *H. Bolander*, 1866 and 1870), and on the Rocky Mountains, "densely cæspitose (Yellowstone Lake 7,400 feet alt. *C. C. Parry*, No. 307, 1873).

This species represents in the western mountain regions our eastern wide-spread *Isoëtes echinospora* var. *Braunii*, and the very local *I. saccharata*. Both collectors found it growing in soft mud covering gravel, and always submerged, but the abundant stomata would seem to indicate that the plant, at times, vegetates out of water. Leaves very slender, ⅓-½ lines in diameter in the lower third, very broad winged below and towards the base. The minute, mostly pointed warts on the macrospores are often confluent, and then represent short wormlike wrinkles; in some specimens I find them almost obliterated. The specimens from Yellowstone Lake are characterized by rather smaller macrospores (0·28–0·38 mm. wide) and a little smaller (0·026–0·029 mm.) almost smooth microspores, and may be distinguished as var. *Parryi*.

The only other species of Isoëtes, thus far found in the western mountains and on the Pacific slope, are:

ISOETES PYGMÆA Engelm.—Very submerged, few (5-10), short (½ to 1 inch), stout,

rapidly tapering dark-green leaves, with very short, often even square epidermis cells, without stomata or bast-bundles; circular sporocarp with a very narrow velum; macrospores 0·36-0·50 mm. wide, marked with smaller and more regular, rarely confluent, rather sharp points; microspores (0·024–0·027 mm. long) brown, very minutely papillose or almost smooth.—In large patches in mud, covering gravel, deeply submerged in running water, on the Mono-trail, eastern declivity of the Sierra Nevada, 7000 feet alt., *H. Bolander*, 1866. Closely allied to the last species, distinguished by its stout, short leaves without stomata, and the markings of the larger macrospores, etc.; in many respects near *I. lacustris*.

ISOETES NUTTALLII A. Braun in litt.—Terrestrial, trunk scarcely lobed; leaves (20–60, 3–7 in. long) 3-angled, slender, firm, erect, light-green, with numerous stomata and 3 peripherical bast-bundles; sporocarp mostly oblong, entirely covered by the velum; macrospores (0·35–0·52 mm. wide) densely covered with minute but prominent, rounded warts; microspores (0·025–0·028 mm. long) papillose, deep brown.—On damp flats or springy declivities in Oregon; on the Columbia, *Th. Nuttall*, 1833; Camass Prairies of the Cœur d'Aleines, *Chs. Geyer*, 1843; Willamette valley, *E. Hall*, No. 693, 1871. Thin but firm leaves, as most land Isoëtes have, with three strong bast-bundles corresponding to the 3 angles. Trunk rhombic in transverse section, only superficially divided by a shallow groove into two lobes. Closely allied to *I. melanopoda* of the Mississippi Valley, which Mr. Hall lately discovered also in Texas, but resembling in the velum the two Florida species *I. flaccida* and *I. Chapmani*.

ISOETES ECHINOSPORA Dur., var. BRAUNII Engelm.—In the Uintah Mountains, at 9500 feet alt., *S. Watson*. The westernmost and the highest known locality of this species.—G. ENGELMANN.

ÆCIDIUM PSORALEÆ.—Spots none; peridia abundant, generally occupying all the lower surface of the leaf, rarely a few on the upper surface, short margin crenulate; spores sub-globose and sub-elliptical, brownish yellow when fresh, yellowish when dry, ·0007–·0008 inch long.—Parasitic on leaves of *Psoralea floribunda*, Colorado Territory.—C. H. PECK.

ÆCIDIUM PARRYI.— Spots none; peridia usually occupying all the lower surface of the leaf, prominent, bright-colored, margin subentire; spores subglobose, bright chrome yellow, ·0008–·0009 inch in diameter.—Parasitic on leaves of *Smelowskia calycina* Meyer. Wyoming Territory.—C. H. PECK.